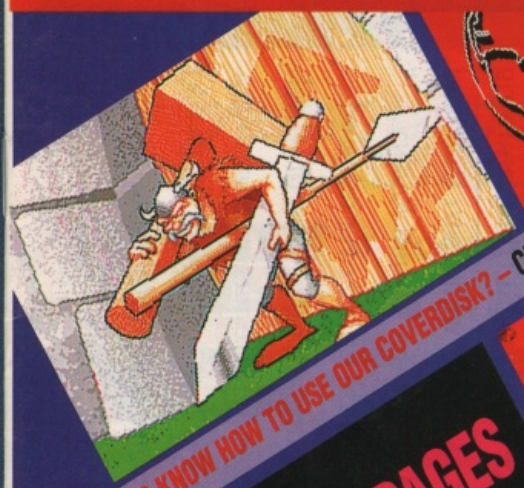
THE COMPLETE GUIDE TO THE AMIGA

CU

AMIGA GRAPHICS & ANIMATION special

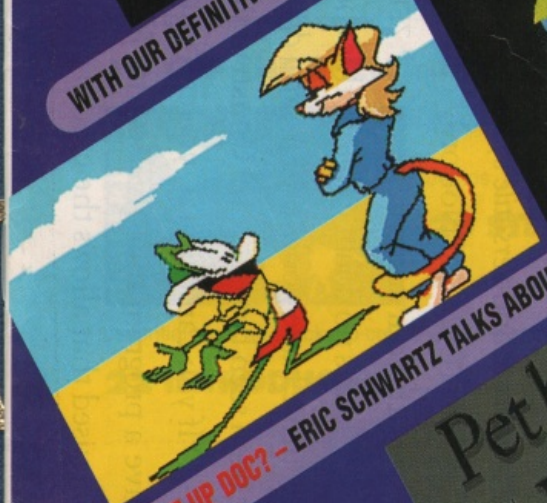


WANT TO KNOW HOW TO USE OUR COVERDISK? – CREATE FANTASTIC ANIMATIONS

FREE! 24-PAGES PACKED WITH HINTS, TIPS AND ADVICE...

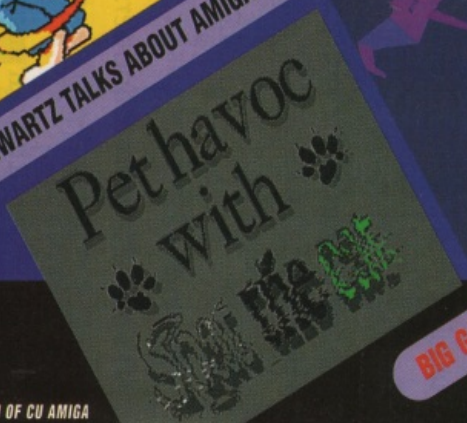
WITH OUR DEFINITIVE GUIDE TO SCULPT ANIMATE 4D JUNIOR. TOOLS OF THE TRADE – WE RECOMMEND THE BEST GRAPHIC PACKAGES

Uncovering the truth behind the awiaa



WE PUT ACTIVA'S REALTHINGS THROUGH ITS PACES

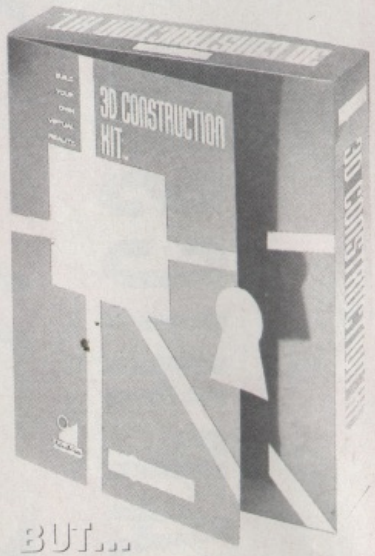
SCHWARTZ UP DOC? – ERIC SCHWARTZ TALKS ABOUT AMIGA CARTOONING PLUS! –



BIG GAME INTROS – ARE THEY REALLY NECESSARY?

AN EMAP PUBLICATION FREE WITH THE MAY EDITION OF CU AMIGA

"This is probably the *best* games creation utility available... **X RATING: XXXXX"** GAMES X "It takes just minutes to learn and the results are *superb*.... It's packed with features and frankly, never has game-making been so easy. You'd be *mad* to miss this opportunity!... " ITV ORACLE C4 "For a total package of all-round *fun* and *entertainment*, the 3-D Construction Kit is an absolute must for the price... **98%"** AMSTRAD USER "**3D Construction Kit** is one of the *best* 16-bit utilities to appear – ever!... Whether you're just interested in using it as a 3D art package or whether you want to create games to rival Incentive's own, you'll find it to be an *ideal tool*... **93%"** THE ONE "Anyone interested in 3D adventure games and a spark of *imagination* should check it out immediately... Stunningly easy to use... The highly *powerful* set of tools, combined with *amazing* ease-of-use, make this an unrivalled game creation system... **91%"** AMIGA FORMAT "Amazing. Would-be architects, city planners, and everybody else should start saving their dosh now!... *go out and buy it*... **92%"** YOUR SINCLAIR "It's A Corker!... **93%"** COMMODORE FORMAT "A *stunning achievement* on the home computer made even more *impressive* by it's ease of use... Lets face it you could buy a lot of rubbish for 25 quid so do yourself a favour and invest it *wisely* in this... **91%"** SINCLAIR USER "An *extremely versatile* piece of software, *technically amazing*, easy and *great fun* to use. This could be the future of home micro software, go and buy it!... **100%"** YC "The program reeks of *quality*... **3D Construction Kit** is easily the most *innovative* piece of Amstrad software ever...95%" AMSTRAD ACTION "Forget world domination this is *world creation*... **91%"** PC FUN "You can use the kit to design your own 'alternate reality'... " PC LEISURE "This is an *excellent* game creation utility... Whether you want to create whole games for friends or models of your house to fly over, it's simple to use and *great fun!*... " CRASH "It's *incredibly simple* and *versatile* system. Clearly it gives insight for the novice into how 3D programming works..." AMIGA FORMAT "Not only can you construct 3D environments, you can walk into that end and interact with your surroundings.... " ZERO "Lego Blocks for adults and your own *Virtual Reality*... " ST FORMAT "There's no doubt about it, this could be the *most impressive* game creation utility ever released... " ACE "Incentive have pooled their *extra dimensional talents* to create a games designer the likes of which has never been seen before... **3D Construction Kit** is *amazing*. It's easy to use and the *results are stunning*... " CD AMIGA "If you can think it, you can build it... it's as simple as that...**95%** " ST. FORMAT (GOLD) "At last we have a program that gives us the *freedom* to produce whatever we want... up until now, no tool has been devised that allows the user to produce a fully fledged 3D environment...**90%**" AMIGA ACTION



BUT...
WE PREFER TO LET THE PRODUCT SPEAK FOR ITSELF.

THE COMPLETE GUIDE TO YOUR AMIGA

CONTENTS

GRAPHICS & ANIMATION *special*

4 TOOLS OF THE TRADE Peter Lee casts his critical eye over the many graphic and animation programs currently available and selects his favourite packages.

7 NEW AND IMPROVED With *DPaint IV*, EA's acclaimed graphics package got even better. Peter Lee takes a look at a couple of the stunning new features.

8 SCHWARTZ UP DOC Animation maestro, Eric Schwartz, reveals some of his animation short-cuts and chats about his work in our exclusive interview.

10 SCULPT ANIMATE 4D Jnr Tutorial Our massive *Sculpt Animate 4D Jnr* tutorial gets underway. Join Tony Dillon as he explains the do's and dont's of computer animation as well as hints and tips on getting the most out of this amazing program.

19 OFF THE SHELF The RealThing's collection of animation brushes can be incorporated into your own stunning demos. Sarah Hibbert explains how.

20 STEP-BY-STEP In the first of an on-going series, Peter Lee reveals some essential hints and tricks to creating better animations.

22 INTRODUCING... Often neglected or criticised, game intros are an artform unto themselves. Steve Merrett takes a look at Eighth Day's stunning intro to Core's Heimdall game.

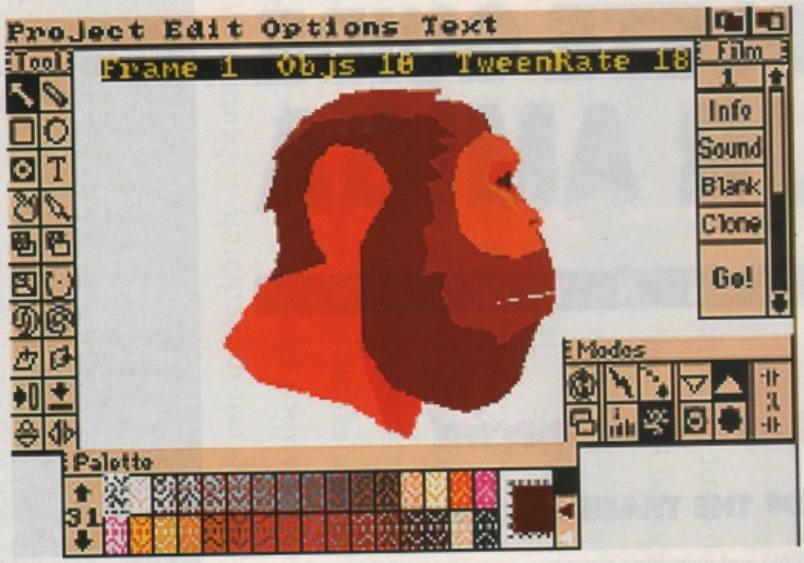
Welcome to the third free supplement to be bundled with CU AMIGA. Most of this issue is devoted to an in-depth tutorial on our superb coverdisk give-away, *Sculpt Animate 4D Jnr*. Inside we'll show you how to get the most out of your free animation program as well as detailing the many options that are under your control. Not only that, but we've also included a Buyer's Guide to all the most useful graphic and animation packages and an interview with Eric Schwartz, the man behind Flip the Frog and the Anti-Lemmings Demo. Rounding off the issue, Peter Lee reveals some clever animation short-cuts and Steve Merrett asks 'are game intros really necessary?'.

EDITOR
Dan Slingsby
ART EDITOR
Andrew Beswick
DESIGN
Andrew Beswick,
Michael Jordan and Partners
(0462 436767)
CONTRIBUTERS
Peter Lee, Steve Keen, Steve Merrett, Sarah Hibbert, Tony Dillon
PUBLISHER
Garry Williams
CU AMIGA
EMAP Images
Priory Court
30-32 Farringdon Lane
London EC1R 3AU
Tel: 071 972 6700
Fax: 071 972 6701

This guide is a free supplement to CU-Amiga and is not to be sold separately.

© 1991 EMAP IMAGES
All rights reserved. No part of this publication may be reproduced in any form without the prior permission of the publisher.

has been devised that allows the user to produce a fully fledged 3D environment...90%" AMIGA ACTION SPEAK FOR ITSELF THE PRODUCT



Since Dan Silva unleashed DeluxePaint into the world, it's been the yardstick against which all other graphic packages have been measured. Peter Lee takes a look at Electronic Arts' award-winning package and its many contenders.

TOOLS OF THE TRADE

With almost as many sequels as the Star Trek movie, *DPaint* is still the program professional Amiga artists turn to first. Version IV's biggest leap was to incorporate a Hold And Modify mode into its vast repertoire – and a great piece of software suddenly became greater still.

Other programs have things to offer, but none seem strong enough to topple the Electronic Arts best-seller. Having said that, there's still some healthy competition out there. To help guide you through the pros and cons, we've taken a look at some of the most popular graphic programs and drawn up a handy comparison chart to help decide which package is for you.

Cartoon-style drawings and funny anims lend themselves to Fantavision's functions.

DPAINT DOES... DISNEY DOESN'T

Eagerly-awaited with a solid-gold name to back it up, *Disney Animation Studio* promised the world to animators. Judging from its mixed reception, though, it failed to live up to some expectations.

I was initially disappointed with the package – a none-too robust art program and a separate colouring program – but I have to admit it does grow on you.

When Disney started his massive entertainment empire, labour was cheap and plentiful and animators worked on individual cells, painting images (initially black and white, later colour) a frame at a time to build up the illusion of movement at the movies.

And so it is with the *Animation Studio*. You create each individual frame (with the benefit of onion-skinning – a technique similar to *DPaintIV's* light box for ghosting multiple frames on the same screen) and then play the sequence back. Clumsily, colour has to be added later – but that's how it happens in real-life cinematic animation.

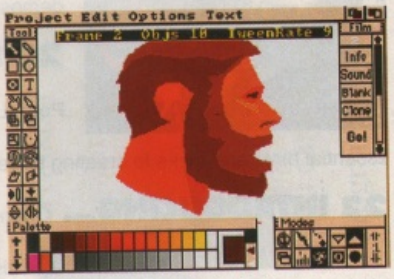
The real nub of *Animator's* problem for me has been the lack of brush animation, which for the kind of work I do, is essential. In *DPaint*, for instance, you can have a brush twist and turn in 3D simply by entering numbers in a requester. To do the same thing in *Studio* would take an age, as each move in space would have to be done by hand.

This leads me to the conclusion that *Studio* is an interesting oddity in the current wave of animation programs for the Amiga – it is an historically accurate transition from the world of movie cartoons to the Amiga, but it won't pay the rent in terms of special effects (negligible) nor speed of use.

VECTOR GRAPHICS

Leaving the popular world of bitmap animation aside for a moment, the other kind – vector movement – has thrown up a couple of very useful programs.

Vector animation differs from the bitmap variety because it uses lines and polygons as its raw material instead of individually-coloured pixels. To use a simple analogy: if you move a rectangle



Polymorphic animation program Fantavision allows you to create images built up of polygons, then have them transform their shape,dynamically. Here a human 'evolves' into a Neanderthal ancestor in two frames; the transition is smooth and seamless as the polygons re-shape themselves to the finished image.

Animation editing made simple thanks to MovieSetter's friendly interface.

of colour in a *DPaint* animation, the block's entire area is shifted about in display memory but in an animation package based on vector graphics, the actual shape and perimeter of the polygon is re-calculated and filled in. This leads to very fast and fluid metamorphing, but obviously restricts the kind of subject you can tackle effectively.

First on the market, not long after the Amiga itself, was *Aegis Animator*, which can blend bitmap animation – galloping horses for instance – and vector animation. As far as I know, the program has never received the kind of overhaul it needs for today's sophisticated users. For instance, in accessing expanded memory. But you should be able to pick up a copy fairly cheaply, and it is fun to build up animations and tween them (watch them bend and stretch into other shapes in successive frames). In fact, Aegis were bundling it along with some other programs from their back catalogue in a value-for-money starter kit not long ago, so there's still some mileage in the program.

A nice feature, which would be welcome on bitmap animations, is the ability to change the palette on the fly, so polygon-based objects can fade in and out with ease after you have subtly altered their colours.

Probably the best-known vector animation package currently available is *Fantavision*. And while it's not as popular as *DPaint*, is does feature a big plus: sound. The user interface is comprehensive, if a little daunting to first-time users unfamiliar with cell animation, but it produces very smooth and useful transitions. Timing and integration of bitmap backgrounds is handled superbly.

Main uses for this kind of program – apart from a sizeable fun element – is for rough and ready cartoon strips and angular video transitions. *DPaint* has pushed these poly-morph packages into an unfortunately small niche, but they are still valuable to animators. However, I don't believe PAL versions of either program are currently available, so your displays will be restricted to the shallow-depth NTSC format.

SETTING THE SCENE

Many animation packages have come and gone in the Amiga's short life, but worth picking up are a couple of animation packages which still do a good job, despite their age. A favourite of mine is *Movie Setter*, from Gold Disk. Released in 1988 it actually outdoes the *Disney Studio* in a number of key areas, including ease of use and editing. Basically it's a cartoon studio in which your sets of animated brushes can move around IFF backdrops. In-built horizontal scrolling is a welcome feature for backgrounds, and both the editing and design elements of the program come together very well. Fun to use and capable of professional-looking sequences, it also features sound.

Occupying a cult corner of the market is *The Director* which is not so much an animation package as a programming language. Still, it has some powerful graphic manipulation features, including the ability to blit objects from one screen to another – enabling you to load in a single screen containing multiple drawings to be 'cut and pasted' onto the display screen. Anims and sounds can be played, and your extra memory can be used for storing in screens to make very fast transitions. It's similar to *AMOS*, another program on the fringes of the serious animation world, because

Before adding the blips and bloings of sound effects.

before anything useful can be done, you have to learn how to write controlling programmes. If you're up to the challenge, then the rewards of both items of software can be enormous.

Another useful animation package, which has had a lot of its thunder stolen by *DPaintIV* is *Spectracolour*, a HAM drawing package which proved a natural successor to *Photon Video*. *Spectracolour* had the 4096 colour market sewn up for a time, and deservedly so. Its brush transitions and colour manipulation far outdo *DPaint*. But it's not the all-rounder of its rival, and in any event, the resolution and fringing difficulties inherent in hold and modify mode prevent widespread use. The animation facilities it offers are not as powerful as *DPaint's* either.

PLAYING AROUND

Although *DPaint* has a wonderful player of its own, and version IV has passable editing functions in its light box tool, there still comes a time when serious editing or amalgamation are called for.

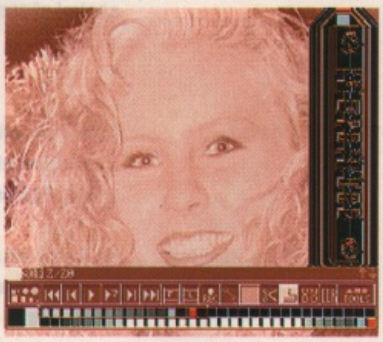
Deluxe Video is, again, almost as old as the Amiga, and the current version gives you total control of your animations. Not only can you load in

Animation editing made simple thanks to MovieSetter's friendly interface.

animbrushes and backgrounds, you can add sound and special transition effects too. Primarily a tool for video users, it is a sophisticated presentation package which offers pinpoint timing and a dream of an interface.

New this year is *Take 2*, Rombo's animation editor with in-built digitising software for their Vidi video digitiser. We took this full-feature package through its paces in our February issue. Since then the program has been upgraded to provide a more complete product, which really does make it even more useful, especially to Vidi Amiga users.

Animation frames from sources such as *DPaint* can be loaded in and edited precisely, and the plus is that you can synchronise sound too. The user interface is still daunting, but the benefits of cutting and splicing, and actually editing sequences of frames makes up for this.



HAM art package SpectraColour also boasts an animation feature, similar to DPaintIV's. Brushes can be moved through frames, with special transition effects in operation. Here the control panel can be seen at the bottom of the screen.

TOOLS OF THE TRADE

GRAPHIC & ANIMATION PACKAGES: WHAT'S GOT WHAT AND WHAT'S NOT

PRODUCT	DESCRIPTION	EASE OF USE	FEATURES	COMMENT
DeluxePaint IV	All-modes bitmap art and animation package.	●●●●●	●●●●●	The all-round all-time favourite.
Disney Animation Studio	Cell drawing, colouring and animation package featuring sound and excellent editing facilities.	●●	●●●	Long-winded but a faithful recreation of how the pro animators get on with the job.
Fantavision	Poly-morphic animation and sound with 2D bitmap brush animation feature.	●●●	●●●	Great for cartoon-style presentations; tough interface to master.
Aegis Animator	Poly-morphic animation, no sound, 2D bitmap brush animation.	●●●●	●●	Old, past its sell-by date but a nice introduction to vector animation. Pathetic inability to use extra RAM.
MovieSetter	Cartoon-style animation presentation package with sound functions plus great editing interface.	●●●	●●●●	Multi-option animator with a big fun factor.
Director	Script-driven image manipulation program.	●	●●●	Will repay a lengthy investment in time. For those unafraid of hands-on programming control at text-entry level.
Deluxe Video	Animation presentation package with icon-driven control of scene editing.	●●●	●●●	One of the best ways to showcase your own animations. No drawing facilities, so you'll need a graphic package too.
Take 2	Animation editing suite; a complement to Vidi Amiga digitiser.	●●	●●●●	Hard slog to master, but worth it if you intend manipulating your anims
Spectracolour	HAM only art and animation package.	●●●●	●●●	A well-rounded HAM programme which still has a few things to show DPaint. Only working in HAM is a major turn-off.

NEW AND IMPROVED

While DeluxePaintIII was a landmark art package, it took the release of version IV for it to realise its true animation potential. Here's a quick guide to some of the best new options.

New to this now classic graphics package came the lightbox, for previewing movement, and the brush metamorph function.

To get the most out of the lightbox, you will need plenty of memory and should be prepared for some time-wasting delays on complex animation screens. But the benefit of seeing previous and forthcoming cells ghosted on the current screen is worth the overheads. Not that every animation will need this heavy-duty technique, only those that primarily have objects easing in and out of key frames.

For quick, easy and stunning animations, you can't beat the metamorph option. It might not always be accurate, and its sometimes clumsy with complex shapes and colours, but it's also a joy to watch whatever the results. It's just so damn clever!

The main problem with it is the restriction on the size of brushes to be changed. These can be quite big – but you'll find that they're never quite big enough! But size isn't too important and having the feature is.

Things to bear in mind are to keep brushes around the same volume, have matching colours in the brushes and give the brush metamorphing process enough frames to render a smooth transition.

BRUSHING UP ON TECHNIQUE

1

Once you have an anim brush, such as a metamorph transition, you can paste it into your animation automatically by holding down the left ALT key and pressing the left-mouse button whilst drawing with the line tool. This lets you draw a path across the screen for the anim-brush cells to follow.

2

To ensure your brush doesn't re-appear midway through the procedure, make the N total in the line requester control box the same number as their are frames, and make sure N Total is the activated option (it's usually continuous which is highlighted). Access to the line requester panel is achieved by clicking with the right button in the line tool from the menu palette.

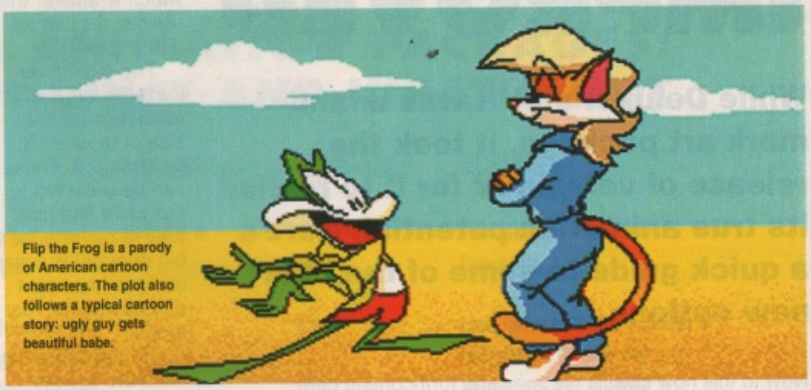
3

The morphing option often leaves you in the lurch by 'forgetting' what the original and end brushes look like. So keep a copy of each to paste down into extra frames at the beginning and end of the animation.

Using DPaint IV's brush metamorph feature lets you meld objects into each other. Here text transforms into a drawing. Brush sizes can't be too big for this feature, and a high number of cells has to be used to ensure fluid transitions. Colour, too, is important to help the program move like-coloured pixels around to make the transition believable.

SCHWARTZ UP DOC?

Without a doubt, Eric Schwartz is one of the giants of Amiga animation. Here he talks about his latest creation, A Day at the Beach, and tells us how it was done.



Flip the Frog is a parody of American cartoon characters. The plot also follows a typical cartoon story: ugly guy gets beautiful babe.

ANIMATED ANTICS

An animation supplement without featuring the work of Eric Schwartz? Unthinkable! So unthinkable, in fact, that we got on the Trans-Atlantic telephone to quiz the teenage animator about his work and, in particular, his latest demo.

A Day at the Beach is undoubtedly his most accomplished work to date. It's certainly the longest and runs for over two-and-a-half minutes with no noticeable gaps in the entertainment. The story concerns two of Eric's all time favourite characters, Flip The Frog and Clarissa the curvaceous cat. In an unlikely coupling, the amorous amphibian has taken his girl for a relaxing day in the sun at the local beach. In true Schwartz style the feline peels off her track suit to almost explode from its constraints to reveal a tiny bikini that sends the frog running into the sea to calm his ardour. On his return, the local life guard has already scoped his girl, and is well into his Charles Atlas routine as the babe nonchalantly gives him a cursory glance and shoos him away.

Flip sees red, and in a blazing trail of fire, speeds to the damsel's rescue only to find that the bulldog's legs are as hard as rock and proceeds to break all his teeth before being dispatched once more into the sea. Clarissa has now had enough and so finally stands up and, with a single punch, sends the dog flying through the air to land buried beneath a ton of sand. That's the basic story, but the 3Mb demo is packed full of laughs all executed with Eric's own distinctive and expressive style.

BACK TO THE FUTURE

We asked Eric where he got all the ideas from for his latest epic. 'I've always wanted to do another cartoon with Flip the Frog,' he says. 'The character initially came from a cartoon that was shown in the 30s which I'd caught on a rerun. I loved the frog's adventures and thought it would be great to introduce him to a new generation.'

So how did you decide on a suitable story to do him justice?

'Well the story came soon after I'd finished *The Dating Game* (another Schwartz classic starring Flip The Frog completed in 1991). I started putting together the demos in January and finished it about the middle of February, four or five weeks later. I worked pretty hard on that one, putting in one to five hours work a day on it. I usually start with a few sketches first and take it from there.'

Eric has a hardware set up that would make most people green with envy, but surprisingly the software he uses is well within most people's grasp. 'I do everything on a 3Mb Amiga coupled with a 45Mb hard drive. After a great deal of thought, I draw preliminary sketches and scribble down a story-board. In this particular instance, I then used the *Disney Animation Studio* and worked for about three hours on some experimental animations. Once I'd got something that was just about right, in black and white, I brought it into *DPaint* and put some colour in. Then the really hard work started as I began to draw the backgrounds that I'd use later, still using *DPaint*.

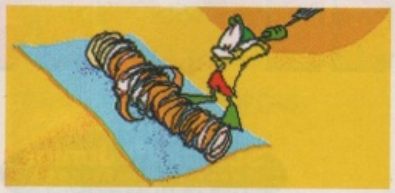
This is the bad guy in the short animation. Eric's own dog acted as the inspiration for this guy – our guess is that Eric doesn't own a poodle or a Yorkshire Terrier.

Eric's animation is aparse and is restricted to a few movements for each scene. These give the illusion of an active environment although little movement is actually taking place.

Take a note of all the different camera angles and close-ups Eric has used. Although tricky to pull off, they help to give a more polished look to his animations.

IN THE MOVIES

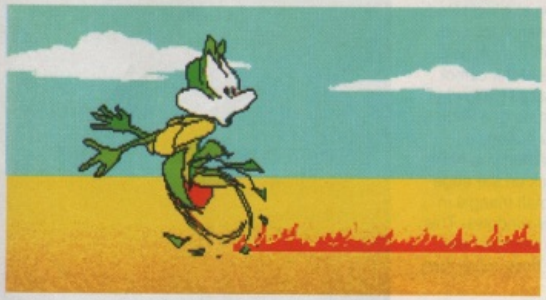
I then switched to *Movie Setter* which I think is the best animation tool on the market, even if it is getting a bit long in the tooth. The package is incredibly useful as you can split your drawings up into separate folders and move them about individually. It's here that I piece together the backgrounds with the animations and then add the sound. I've got a huge library at home with over 100 sampled sounds of all sorts of things that I delve into for most of the effects. If I need any speech, I either supply it myself (Clarissa's voice is actually Eric's speeded up), or get whoever's passing my room to do the honours. The old man in the bathroom in the *Late Night* animation is my father and the female Lemming's voice at the end of the *Anti-Lemmings Demo* is my mother's speeded up. The real difficulty comes in trying to sync the sound and animation together. *Movie Setter* only allows you to work in Hi-Res and 32-colours and it's quite slow, so anything that needs to be faster than 10 frames per second I tend to use *DPaint 4* . To be honest, it's all a case of trial and error, but well worth it when you get it right.'



Eric has many more Flip adventures awaiting animation and another adventure will appear soon, he promises.

Eric hasn't always been animating on a computer and before he discovered pixel perfection he was doing elementary clay stop-start animation and cut-out stop-frame films with his own admirable drawings. 'This summer I might be doing a film,' says Eric. 'It'll be with Amy and all the animation will be on the Amiga, but distributed on video.' Eric usually gives his demos to local user groups when they're completed and is amazed at the speed in which they're available over here, on our own PD circuit, about two weeks later.

Some of these scenes would not look out of place in a Hanna Barberra or Tex Avery cartoon.



In his fury, Flip inadvertantly misses the mark and shoots straight past his beloved.

Here the scene totally changes from a fun day out to an intimidating situation by tight cropping.

RAINING CATS AND FROGS

The last time we spoke, Psygnosis had approached him to discuss the possibility of producing an intro for one of their games. 'I haven't heard from them recently, but they were very complimentary and the American division actually paid me for the use of a *Lemmings* animation I'd done for a show.' Team 17 were also rumoured to be after his talents. 'Once again, the distance between us has meant a slight hiccup in communications. Initially I was working on a *Super Mario*-type game called *Super Frog and Friends*. Then they switched me to a racing game called *Joyride* and now I'm supposed to be on a new project, so I'll just have to wait and see what happens next. I'd heard that Tobias Richter had done some work for them also for a game called *Alien Breed*. He's one of the people I admire most in the demos field so I'm looking forward to seeing that.'

Asked about his next project, Eric is naturally very cagey. 'I find it very difficult to talk about what I'll be doing next because, in all honestly, I don't know. The last couple of Aerotunes, *Shuttle Cock* and *Vietnam Conflict*, I did in a couple of days, the later only took five hours so I'm getting an itch to do one of those again. I was thinking of including a cameo appearance by Amy the squirrel in *A Day At The Beach*, but what with memory restrictions, it became impossible. The *Stealthy* animations are a lot less restricting. I basically work on them pretty much as you see them, from beginning to end. One idea I have is for an A-10 Thunderbolt skit, a huge military aircraft known over here as the Wart-hog. It'll home in on a tank and have a wild chase through the mountains before the final show down. Yeah, that sounds like a fun thing to do.'

'I'm also thinking about doing another female juggler animation called *Jugglette* and I'm itching to do a sequel to the *Anti-Lemmings Demo*, so that'll probably come first.' Phew! With that work load, it's enough to make you glad you're a talentless creep!

What really sets Eric apart from other animators is his constant attention to detail and his command of different facial expressions.

Down, but not out. I'm sure he'll be back!

SCULPT ANIMATE 4D JUNIOR

You've got the free giveaway program, you've read the quick user guide printed on this month's Coverdisk pages, and now you want to take a closer look at *Sculpt Animate 4D Jnr*. Rest easy, as over the next six pages, Tony Dillon explores the finer points of this superb 3D graphic and animation program.

Sculpt 4D Junior
Copyright 1989-1992
Byte By Byte Corporation.
ALL RIGHTS RESERVED.

BASIC PRINCIPLES

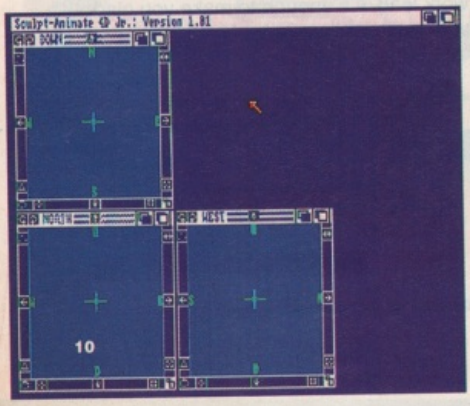
Sculpt Animate 4D Junior has been designed to let you, the user, create and animate complex 3D scenes with a simple entry method and the minimum of mathmatical or technical knowledge.

All objects are broken down into three components. The smallest is the vertex, which is a single point anywhere on a shape.

Vertices are usually corners of objects, and are connected by edges. These straight lines give the shape a wire frame appearance, but won't actually register anything until you turn the spaces enclosed by edges into faces. Faces are always triangular, and tell the program to display that particular area as a solid block. Triangles can be placed together in any way and to form any shape. Here's an example of how a cube would be broken up into triangles.

THE TRI-VIEW WINDOWS

All objects and scenes are displayed in these three windows which represent your view on the object if you were (a) above the object looking directly down at it, (b) south of the object looking north and (c) east of the object looking west. When cross-referenced, these three windows give you an instant impression of the 3D shape, and give you complete cursor control in a 3D area. To place the cursor in a particular position, first left click in the Down window to position the X and Y co- ordinates of the cursor, and then click in either of the two remaining windows to position the height. Simple isn't it.



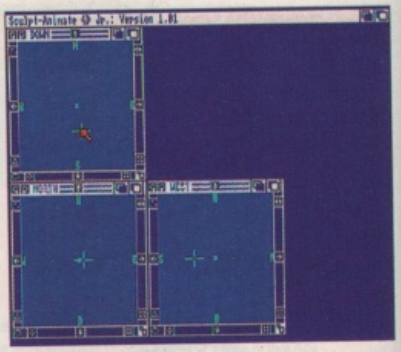
OBJECTS, IMAGES AND SCENES

Throughout the program and these pages, you will hear things referred to as either an Object, an Image or a Scene. To explain, an Object is a collection of highlighted connected vertices, an Image is a rendered picture and a Scene is the entire highlighted area you are creating in, including lamps, observer positions and objects not currently in the tri-view windows.

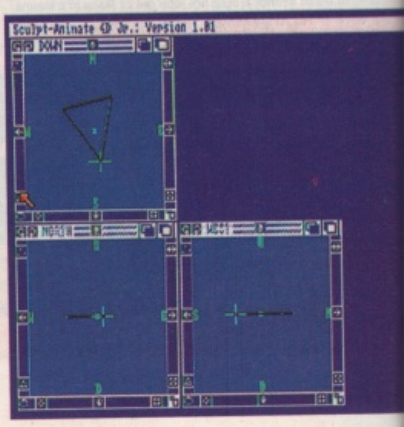
CREATING SHAPES

To create a shape, first vertices have to be created. Position the cursor in the way just described, and then click the right mouse button with the left held down. A small yellow dot will appear at the cursor position. Vertices can be either selected (yellow) or deselected (black). To change the state of a vertex, double click on it with the left mouse button.

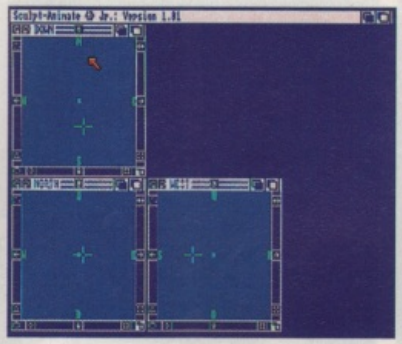
Next, edges have to be placed. When you have more than one vertex on screen, click on the edge builder gadget, which looks like a small triangle in the bottom left of each of the tri-view windows. This will connects groups of two or three selected vertices with straight black lines. If you have more than three or less than two highlighted, the gadget won't work.



Every triangle formed is a face, and will be displayed. Any other shape won't, so remember to

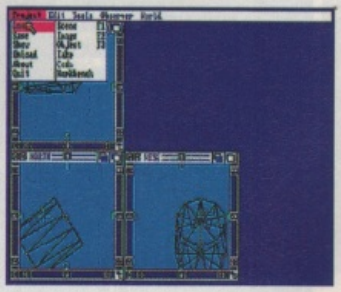


break up other shapes into triangles by using the Edge Builder option from the TOOLS menu in the bar at the top of the screen.



THE MENU BAR

The menu bar at the top of the screen is full of all sorts of exciting options. A full guide to all these options follows, with the menu heading marked with a number, the name of the option in capitals, and sub-options in normal case.



1) Under PROJECT

LOAD:

a) Load Scene
b) Load Image
c) Load Object
These three options load previously saved files into the current tri-view window.

d) Load Take
This gets animation files from a selected disk. If you name a file that isn't present on the disk, a requester will ask you if you want to create a new take. Click on Yes to start a completely new animation.

e) Load Code
Loads the program code back into memory. For more information, see UNLOAD CODE.

f) Load Workbench
Loads the Workbench screen and places it behind the Sculpt screen. For more info, see UNLOAD WORKBENCH.

SAVE:

a) Save Scene
b) Save Image
c) Save Object
These save respective files to disk. Remember to highlight objects before you save them!

SHOW:

a) Show Image
Shows the last image generated, if any has.

b) Show Preview
Loops through the last generated animation, if one has been. If no Takes have been set up since boot-up, then this option will not be accessible.

UNLOAD:

When memory is running low, *Sculpt 4D Jnr* may not be able to function fully. The four Unload options give you a chance to recover some of that much needed RAM space.

a) Unload Image
Clears the currently stored image. Don't worry, it only removes it from memory, so make sure you have it saved to disk before you unload it.

b) Unload Preview
Removes the currently stored wire frame animation. Animations can take up massive amounts of memory, even when compacted, so keeping this area clear is sometimes essential.

c) Unload Code
Sculpt 4D Jnr is a massive program, that uses up a lot of space in itself. However, no one can be

THE TRI-VIEW GADGETS EXPLAINED

On each tri-view screen are positioned a number of gadgets/icons which perform different functions. Here we list the most important and explain what function each one performs.

REVERSE
This changes the view direction of the current window to its opposite. For example, in the north window, selecting this places you north of the object looking south.

MOVE TRI-VIEW
These scroll the view in the tri-view around the scene, allowing you to work on other parts of your picture, such as different objects.

EXPAND TRI VIEW
This increases the size of the view in the Tri-View window, letting you see more of your current scene.

CONTRACT TRI VIEW
This decreases the size of the view, zooming in on the centre of the view.

CENTRE TRI VIEW
This centres the viewpoint on the cursor position, and is a faster way of making an object the centre of attention.

GRABBER
This gadget is used to move selected points around the scene. Select the vertices you want to move, and then click on this to activate the grabber. All selected points are moved at once with the left mouse button moving the points in relation to the new cursor position. This can be used to move whole objects, by selecting all the points in the object, or to stretch and deform objects by pulling some of the vertices. Click on the icon again to deactivate it.

EDGE BUILDER
Not to be confused with the tool in the TOOLS menu, this automatically connects pairs or groups of three selected vertices.

SELECT/DESELECT
This icon either selects all the vertices in the tri-view or deselects them, dependant on the state of vertices in the window.

ROTATE
These two gadgets rotate all selected vertices about the current cursor in steps of five degrees. If used in conjunction the left ALT key, the rotation is only 0.1 degree. Used with the left Amiga key, the rotation is 1 degree. If the right Amiga key is used, it's 45 degrees and with right ALT it's a whopping 180 degrees.

SCULPT ANIMATE 4D JUNIOR

expected to be using all of the features and tools all of the time, and this command clears all the unused features from memory, creating masses of space for all your work. You can still access all the features, just wait for them to load from disk.

d) Unload Workbench
Once loaded, you probably won't find the need to keep Workbench running, so this option empties the memory Workbench occupies.

ABOUT:

Gives details on your version of *Sculpt Animate 4D Junior.*

QUIT:

Exits the program and returns you to workbench.

2) Under EDIT

SELECT/DESELECT:

(All deselect options have the opposite effect to select options)

a) Select All:
Highlights all vetrices in the tri-view windows. A lot easier than double clicking everywhere!

b) Select Connected:
This only highlights the vetrices that are joined by edges.

c) Select Indicated Vertex:
This is the equivalent of double clicking the left mouse button over a vertex.

d) Select Swap:
This reverses the state of all vetrices in the current window. Selected become deselected and vice versa. This comes in handy when you have a large, complicated object with only a couple of other vetrices on screen. Select the few free vetrices then perform a Select Swap to highlight your more complicated object.

e) Select Indicated Edge: Place the cursor on an edge before using this command. When performed, it selects the two vertices at either end of the line.

ERASE:

a) Erase Selected Vertices: This is used to remove all highlighted points. All edges leading from these points are also erased.

b) Erase Selected Edges: This just removes the edges between selected vertices, not the vertices themselves.

c) Erase Indicated Vertex: Place the cursor over a vertex and use this to remove it from the scene.

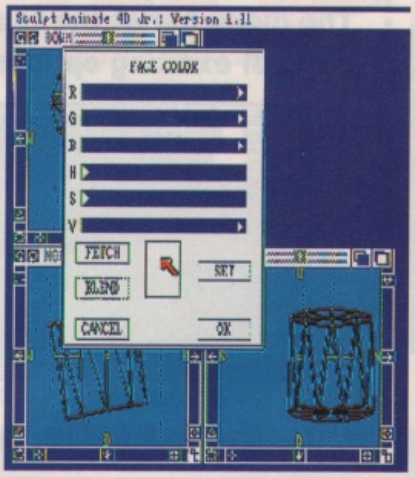
d) Erase Indicated Edge: To remove a single edge, for example one you placed by accident, place the cursor over it and use this function.

e) Erase Indicated Lamp: To remove a lamp from your scene, place the cursor over it, and then the mouse pointer over this option.

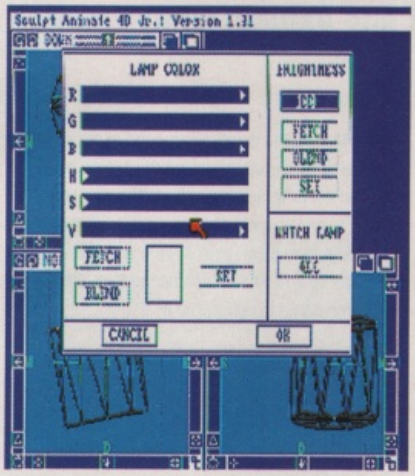
f) Erase All Lamps: Places scene in darkness.

g) Erase All: Clears everything from the scene. If you have a take in memory, the program will ask you if you wish to erase that as well. Erase only dumps if from memory, not from the disk.

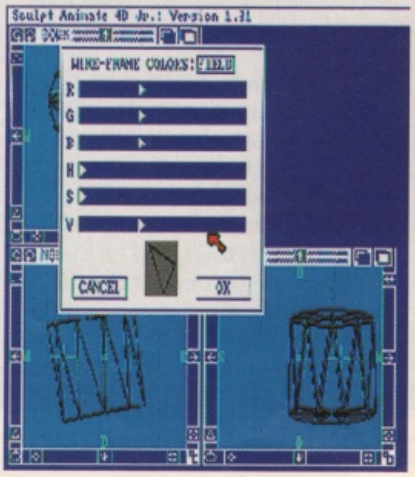
MODIFY:



a) Modify Faces:
The Faces requester pops up on this command, allowing you to change the default colour of faces as well as change the colours of already defined faces through careful use of slider bars.



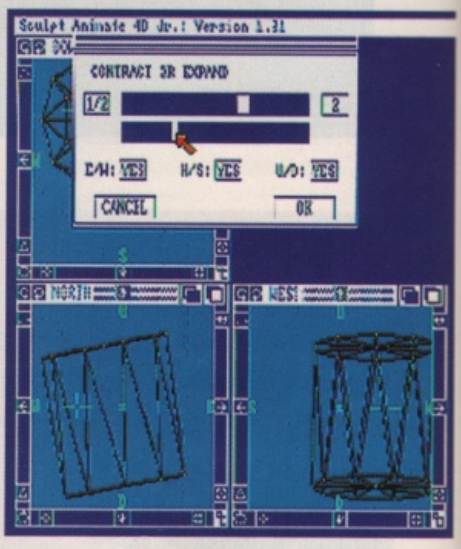
b) Modify Lamps:
Like the Faces requester, the Lamp requester allows you to change the default colour and brightness for new lamps, as well as change defined lamps.



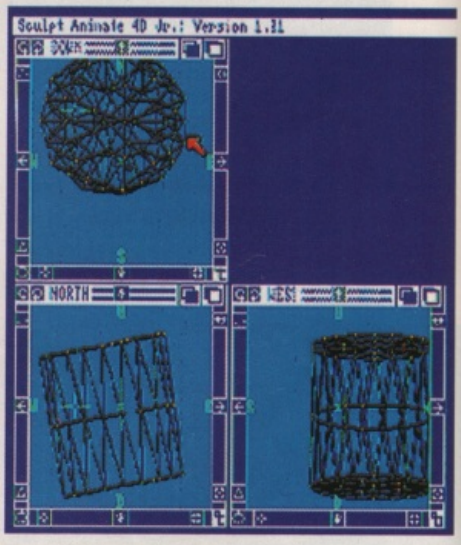
c) Modify Wire Frame Colours:
This option lets you change the colours of wire frame images from boring but clear two-tone grey to more exciting brown and purple.

d) Modify Take: This is the heart of the animation programmer. It contains two separate requesters, Global and Frame. The default is Global, but you can change it by clicking on the requester name at the top of the box. For more information, see the Animation Box.

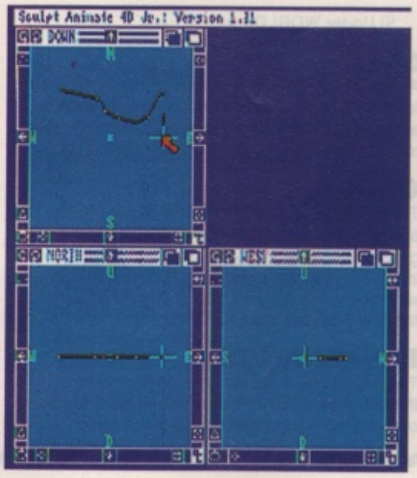
DO:



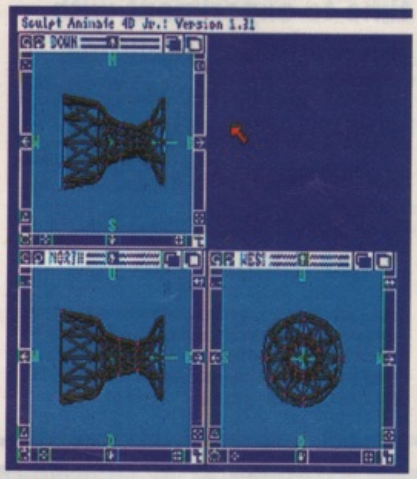
a) Do Expand:
Using this along with a set of selected vertices allows you to expand the set, i.e. move them all apart a specified distance. This is useful in the case of a sphere or a hemisphere that has been subdivided, yet its appearance hasn't changed. Selecting all the new points, and then expanding them slightly using the slider bars gives the sphere a more rounded appearance.



b) Do Subdivide:
This places a new vertex at the centre of every selected edge, and then connects them, giving an object twice as many edges and vertices as before.



c) Do Spin:
This draws a 3-dimensional round object of a shape defined with the curve tool and currently selected. All highlighted edges and vertices are swept about a line that extands horizontally from the cursor position. A requester will appear asking you how many steps there should be in a full turn, and then in which direction the sweep should go. At default this is 360 degrees, but feel free to experiment.



d) Do Reflect:
Highlight an object and place the cursor next to it. Using this option places an identical copy of the object on the opposite side of the cursor.

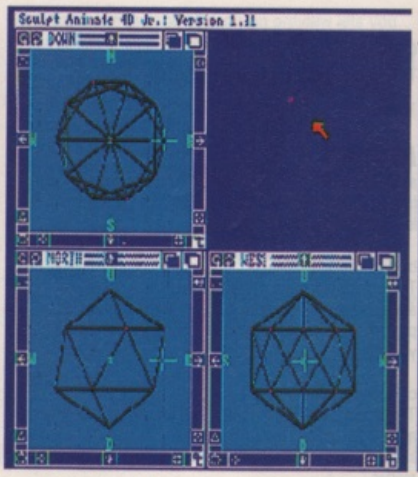
e) Do Make Tri-View Small: This sets the size of the tri-view windows (not the area they show) to default.

f) Do Make Tri-View Big: This blows the Tri-View windows up so they fill the screen.

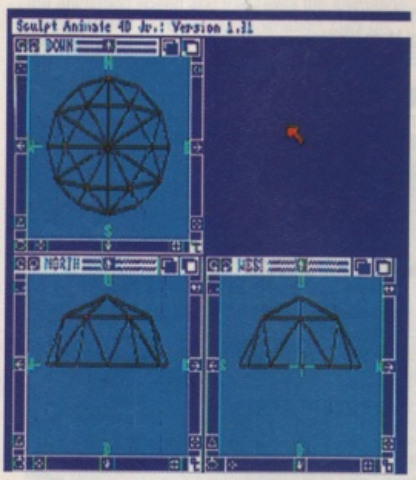
ADD:

a) Add Duplicate: This makes an unselected copy of a selected object or set of vertices. The copy won't be visible until you move the selected original with the grabber.

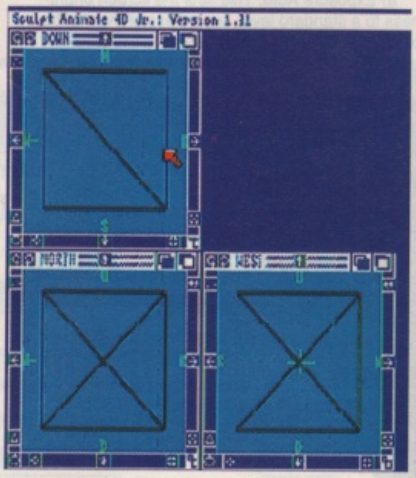
b) Add Sphere: This creates an approximation of a sphere and fills the current tri-view window with it. A requester will appear asking you how many subdivisions you want. The more you have, the more detailed the shape will appear, and the more memory it will consume.



c) Add Hemisphere:
This adds a hemisphere to fill the current tri-view. Again, you are asked how many subdivisions you want.

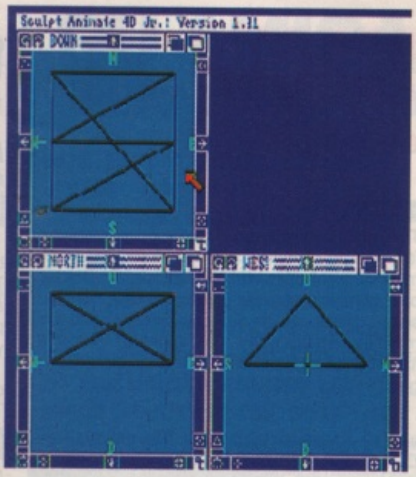


d) Add Cube:
Adds a cube to fill the tri-view.



e) Add Prism:
A triangular prism appears inside the tri-view.

f) Add Disk:
g) Add Circle:



h) Add Cylinder:
i) Add Tube:
j) Add Cone:
All these options creates an equaliteral shape with a requested number of vertices for the bottom face. The shape created almost fills the current tri-view window.

k) Add Lamp:
Creates a lamp at the current cursor position.

l) Add Vertex:
Places a highlighted vertex at the cursor position.

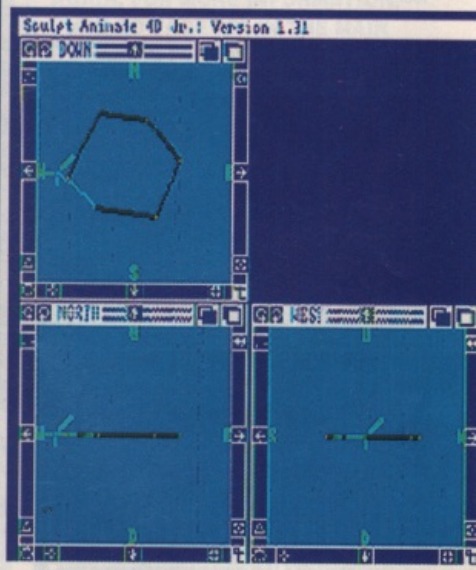
m) Add Edges:
This has the same effect as clicking on the edge-builder in the tri-view window.

3) Under TOOLS

CURVE:

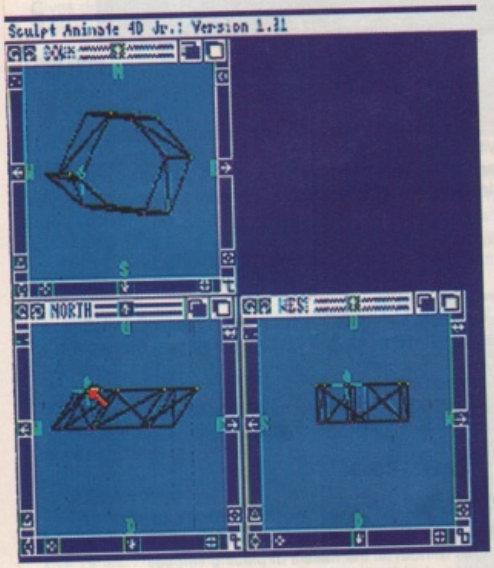
The curve tool allows you to plot curves and shapes without all the hassle of placing vertices and then placing edges.

Place a vertex in the normal way and keep the left button held down. A rubber band will be drawn from the last placed vertex to the cursor. Place another vertex and the same will happen again. This will keep on happening until you click the right mouse button to exit this tool.

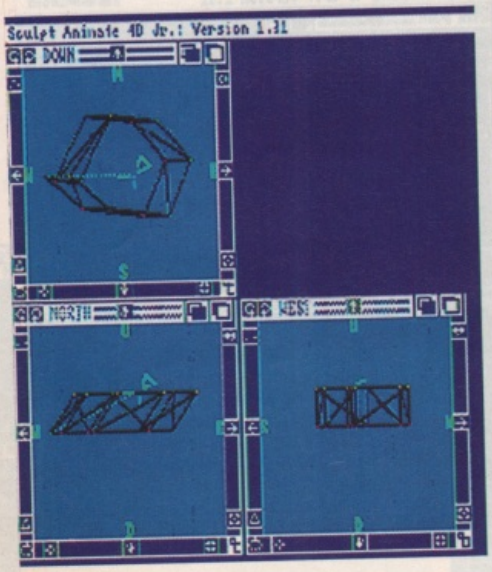


SCULPT ANIMATE 4D JUNIOR

EXTRUDE:
The extrude tool is used to turn a 2 dimensional face into a 3 dimensional shape. When selected it makes a highlighted copy of the currently selected object and activates the grabber. Moving the cursor around places the duplicate and connects all matching vertices with edges, therefore creating a 'blocked out' shape. When finished, click on the grabber to deactivate.



EDGE MAKER:
This rubber band tool lets you join vertices freely, and is especially useful for filling in outline shapes. The left button is held down, and the right button selects the start and end vertices for the edge. When the end vertex is selected, the line is automatically drawn. Right button on its own drops the tool.



GRABBER:
The same tool as the one in the Tri-View icon.

4) Under OBSERVER

MODE:
a) Mode Wireframe: This renders the current image in wireframe with only edges displayed. This mode is fast and ideal for quick checks on your scene.

b) Mode Sketch:
This quickly renders a colour version of your scene. Faces are all displayed, rear ones first, and aren't always hidden properly. This mode is really just another way of checking your scene.

c) Mode Scanline:
This draws the picture properly, with full light-source shading and hidden faces. This is the mode you display your finished image in, so it will take a little more time than the other two modes.

d) Mode Lo Res:
e) Mode Hi Res:
Selects between Amiga Lo-Res and Hi-Res.

f) Mode No Interlace:
g) Mode Interlace:
Selects between displaying with or without vertical interlace.

LOCATION:
This places the viewpoint of the picture at the current cursor location.

TARGET:
Using this sets the target of the camera at the current cursor position.

LENS:
a) Lens Normal:
b) Lens Wideangle:
c) Lens Telephoto:
Selects the camera lens. Used for seeing more or less of a scene.

d) Lens Special: This asks you for non-standard lens type. A low number (below 30) specifies different wideangle lenses, whereas a high number (over 70) prompts for a telephoto lens.

EXPOSURE:
a) Exposure Auto: This sets the screen brightness to a standard level, regardless of the number or brightness of any lamps used.
b) Exposure Manual:
Using lets you set the overall brightness of the picture. 100 is the standard level, with the image getting brighter or darker dependant on how far above or below 100 your exposure is.

IMAGE SIZE:
a) Image Size Medium: With this selected, all images created are displayed in the bottom half of the screen.
b) Image Size Full: With this, images are displayed full screen.
c) Image Size Overscan:
All images displayed are larger than screen size.

START:
This generates the image under the current settings and then displays it. To remove it from view, click on the image with the left button and then with the right.

ABORT:
Interrupts and stops an image being generated.

STATUS:
This switches the status line at the top of the screen on and off.

5) Under WORLD

SKY:
A colour slider requester appears. This allows you to select the colour of any sky in the picture. A box at the top of the requester lets you choose whether to have a solid sky colour, or no sky at all.

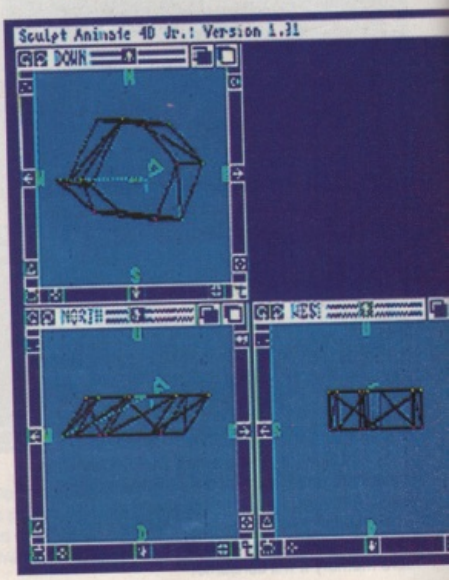
GROUND:
This brings up a similar box to the sky requester, and again you can choose to have a solid colour ground or none at all. If a colour is selected, a horizontal line appears in the north and west tri-view windows to display ground level. Anything below this line is hidden when rendered.

ILLUMINATION:
This allows you to set background illumination through slider bars. This prevents jet black shadows and helps bring depth to your pictures.

GET ANI

Once you've got to grips with the basics, it's then time to experiment with the animation facilities put at your disposal. Again, it's not that difficult, and merely requires a bit of experimentation to get things right.

Sculpt 4D Jnr allows you to create animations with your scenes, moving and changing your objects all the time. This it does using a system called Key Frames. Key Frames allows you to only enter the most important frames of a



allows you
ture. A box
se whether
ll.

equester,
id colour
ted, a hori-
t tri-view
ng below

nation
ck shad-
es.

ANIMATED

grips
then
with
ties
iffi-
uires
tion

ations
your
system
you to
a

STATUS BAR:

While the menu bar is hidden, a status window is displayed at the top of the screen. The stats mean, from left to right:

- **Amount of Chip Memory remaining**
- **Amount of Fast Memory remaining**
- **Number of Selected Vertices**
- **Number of Unselected Vertices**
- **Number of Edges**
- **Number of Faces**
- **Number of Lamps**

sequence, and the program works out all the frames in between automatically. To create an animation, select Load Take from the PROJECT menu, enter the name of your animation to create a new file, and then go to the Modify Take option, where you can switch between Global and Frame Requesters.

In the Global box, you set all the information for the entire animation. Most of the information boxes are self explanatory, but here's a quick run down. The Number of Frames gadget is where you specify how long the animation is in frames. The RAM animation gadget cycles when clicked upon between Regular, Economy and Anim 5. Anim 5 provides the best compression, but RAM animation gives the fastest playback. The loop mode lets you choose the style in which the animation is played, and is a cycling gadget. 'None' means the animation will play once and stop. 'Loop' means the animation will play in an infinite cycle and 'Oscillate' means the animation will bounce backwards and forwards, end to end. Preview Size chooses the size on screen of the wire-frame animation preview, and clicking on preview lets you see a wire-frame version of your animation. This renders much faster than the scanline images, and therefore is far more convenient for the sake of speed. The Save Images toggle selects whether or not the program stores each image on disk as it renders them, and the Save/Load Global Scene requesters save or load a global scene to use as a background to your animation.

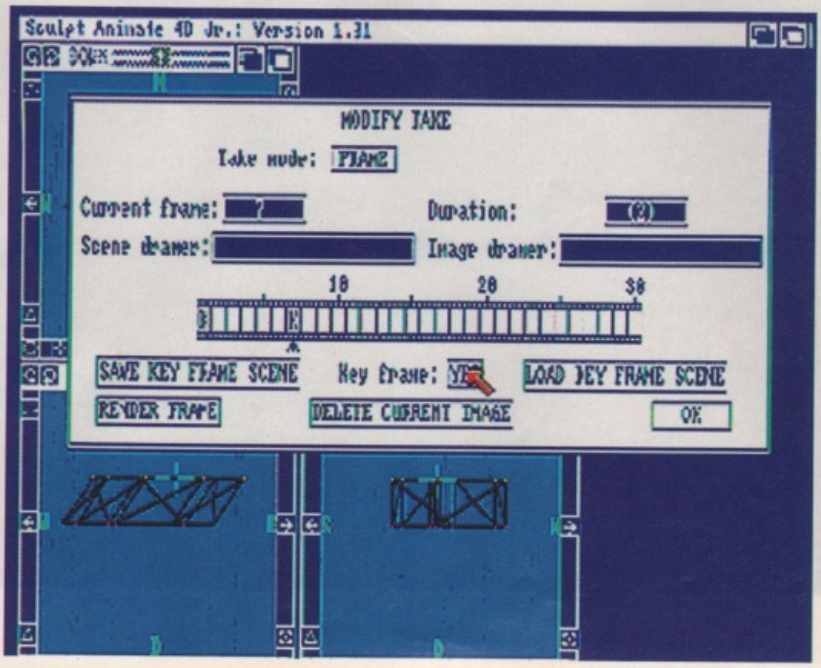
The Frame Box allows you to work on individual frames. At the bottom of the window is a strip of film to the length of frames you specified. The first thing you need to do is select which of the frames are your key frames. This you do by clicking on the frame with the left mouse button, and then clicking on the 'Key Frame?' gadget, to turn it from "NO" to "YES". A letter K will appear in the frame to signify this is a key frame.

Once done you have to create all your key frames, and this is very simple. Exit the requester and create your key frame. Then return to the modify Take box and click on the current Key Frame, and then on 'Save Key Frame'. Repeat this process until all Key Frames are filled. Then cut back to the Global screen and click on preview to create a wire-frame animation.

While the preview is playing, keys 0-9 change the animation speed and ESC exits the animation. To create and save your full animation, click on "Render All".

TH...TH..THAT'S ALL FOLKS!

And that's all there is to it. Don't worry if it all sounds like a foreign language. Once you've loaded up the program and worked through our Coverdisk tutorial it should all become a lot more obvious. If it's still double dutch, keep reading CU AMIGA, as we'll be giving an even more in-depth tutorial in an upcoming issue.



CU AMIGA UPGRADE OFFERS

NOW THAT YOU'VE GOT TO GRIPS WITH SCULPT 4D JNR, YOU MIGHT BE INTERESTED IN READING THE OFFICIAL BYTE BY BYTE MANUAL. THIS IS PACKED FULL OF USEFUL HINTS AND TIPS ABOUT GETTING THE MOST FROM YOUR £100 PACKAGE. CU AMIGA CAN OFFER A COPY OF THE MANUAL FOR THE LOW PRICE OF JUST £14.95, SO IF YOU WANT TO GET TO GRIPS WITH SOME OF SCULPT 4D JUNIOR'S MORE INTRICATE WORKINGS, TURN TO PAGE 159 IN THE MAIN MAGAZINE FOR MORE INFORMATION ON HOW TO ORDER THE BOOK.

IF YOU'VE BEEN INCREDILY IMPRESSED WITH OUR COVERDISK PROGRAM, YOU MIGHT WANT TO EVEN UPGRADE TO THE ULTIMATE IN RAYTRACING EXCELLENCE: SCULPT ANIMATE 4D. THIS PROGRAM HAS ALL THE FEATURES OF THE COVERDISK VERSION, PLUS FULL RAYTRACING CAPABILITIES, HAM/24 BIT OUTPUT, ENHANCED ANIMATION FACILITIES, SURFACE DITHERING, DISTORTION TOOLS AND MIRRORED SURFACES.

AS A SPECIAL UPGRADE OFFER TO OUR READERS, CU AMIGA CAN PROVIDE A FULL BOXED VERSION FOR THE AMAZINGLY CHEAP PRICE OF £170, A MASSIVE SAVING ON THE RECOMMENDED RETAIL PRICE. AGAIN, FOR MORE INFORMATION, TURN TO PAGE 159 IN THE MAIN MAGAZINE FOR MORE DETAILS.

WARNING: DUPLICATION, DISTRIBUTION, OR REDISTRIBUTION OF THE SCULPT 4D JNR SOFTWARE BEYOND THE CU AMIGA COVERDISK VIOLATES BYTE BY BYTE CORPORATION'S COPYRIGHTS. IF YOU DO PIRATE THIS COPY, YOU ARE, IN EFFECT, DESTROYING THE SOFTWARE INDUSTRY. THE PROGRAM'S AUTHOR, DR. ERIC GRAHAM, HASN'T SPENT YEARS PERFECTING THIS PROGRAM FOR IRRESPONSIBLE PEOPLE TO RIP HIS WORK OFF. PLEASE RESPECT ALL THE HARD WORK THAT HAS BEEN PUT INTO THIS PROGRAM. THANKYOU.

SCULPT ANIMATE 4D Jnr

***Sculpt 4D Jnr* is a copy protected program. When the program starts to run, you'll be asked to type in a word from a specific place in the manual. Of course, you don't have the manual, so we've listed the key words together with the pages on which they appear. So, all you have to do, is to type in the required word and away you go. Don't worry about the weird colours we've used to print them on – we know it makes them difficult to see but it prevents the list from being successfully photocopied and thus stops piracy.**

Page 1-1	last paragraph, first word	unless
Page 1-1	last word	face
Page 1-1	last line, first word	limited
Page 1-2	forth line, last word	amiga
Page 1-3	first paragraph, last word	cutter
Page 1-3	second paragraph, first word	objects
Page 1-3	second paragraph, last word	ease
Page 1-3	last word	pointed
Page 1-3	second paragraph, second line, last word	built
Page 1-3	second paragraph, third line, first word	these
Page 1-4	last paragraph, first word	even
Page 1-5	last paragraph, first word	object
Page 1-5	last word	much
Page 1-5	last line, first word	more
Page 1-6	last paragraph, first word	as
Page 1-6	first line, last word	key
Page 1-6	last line, first word	explore
Page 2-1	last paragraph, first word	for
Page 2-2	last paragraph, first word	after
Page 2-3	last paragraph, first word	look
Page 2-3	last paragraph, first word	left
Page 2-4	last word	house
Page 2-5	last word	others
Page 2-5	first line, last word	solid
Page 2-6	last line, first word	three
Page 2-7	last word	down
Page 2-7	first line, first word	cursor
Page 2-7	third line, first word	jump
Page 2-7	fourth line, last word	mouse
Page 2-8	last word	left
Page 2-8	second line, first word	item
Page 2-8	third line, first word	menu
Page 2-8	last line, first word	menus
Page 2-9	last word	on
Page 2-10	first paragraph, first word	after
Page 2-10	first paragraph, last word	lot
Page 2-10	second paragraph, last word	computer
Page 2-10	third line, last word	user
Page 2-10	second paragraph, third line, first word	files
Page 2-12	first paragraph, first word	if
Page 2-12	third line, last word	reveal
Page 2-12	last line, first word	image
Page 2-12	second paragraph, second line, first word	and
Page 2-12	second paragraph, third line, first word	slider
Page 2-13	first paragraph, last word	them
Page 2-13	last paragraph, first word	below
Page 2-13	last line, first word	leave
Page 2-13	last word	yes
Page 2-14	last paragraph, first word	this
Page 2-14	last word	shapes
Page 2-16	last paragraph, first word	at
Page 2-16	last word	window
Page 2-17	last line, first word	are
Page 2-18	third line, last word	house
Page 2-20	first paragraph, last word	gadget
Page 2-21	last word	size
Page 2-22	first paragraph, last word	button
Page 2-22	second paragraph, last word	disk
Page 2-22	last paragraph, first word	for
Page 2-22	second line, first word	expand
Page 2-22	second paragraph, second line, first word	tiny
Page 2-24	last line, first word	save
Page 2-26	third line, first word	curve
Page 2-27	first paragraph, last word	one
Page 2-27	last line, first word	was
Page 2-27	second paragraph, first line, last word	in
Page 2-27	second paragraph, third line, last word	every
Page 2-29	last line, first word	hands
Page 3-1	last word	shown
Page 3-2	last paragraph, first word	now
Page 3-2	last word	which
Page 3-3	last paragraph, first word	in
Page 3-3	fourth line, first word	lists
Page 3-4	last line, first word	called
Page 3-5	third line, first word	target
Page 3-5	Section title, first word	camera
Page 3-6	first paragraph, first word	the
Page 3-6	last paragraph, first word	like
Page 3-6	last word	out
Page 3-6	fourth line, last word	lens
Page 3-6	last line, first word	lit
Page 3-6	second paragraph, second line, first word	focal
Page 3-6	second paragraph, third line, first word	enter
Page 3-7	first paragraph, last word	effect
Page 3-7	last paragraph, first word	take
Page 3-7	last word	be
Page 3-7	third line, first word	manual
Page 3-7	last line, first word	before
Page 3-8	last paragraph, first word	what
Page 3-8	last word	target
Page 3-8	last line, first word	camera
Page 3-9	last paragraph, first word	image
Page 3-9	last word	time
Page 3-10	last paragraph, first word	when
Page 3-10	last word	is
Page 3-10	last line, first word	there
Page 3-11	last paragraph, first word	it
Page 3-12	last word	much
Page 3-13	last line, first word	careful
Page 4-2	last word	by
Page 4-2	last line, first word	playing
Page 4-3	last word	gadget
Page 4-4	last word	mode
Page 4-4	last line, first word	sketch
Page 4-5	first paragraph, last word	start
Page 4-5	last word	from
Page 4-5	last line, first word	in
Page 4-5	second paragraph, second line, first word	art
Page 4-5	second paragraph, second line, last word	right
Page 4-6	last word	three
Page 4-7	last paragraph, first word	if
Page 4-7	last line, first word	view
Page 4-9	last word	case
Page 4-9	last line, first word	edit

Page 4-11	first paragraph, first word	note
Page 4-11	first paragraph, first word	selected
Page 4-11	second paragraph, second line, last word	edges
Page 4-11	second paragraph, third line, last word	that
Page 4-12	last word	to
Page 4-12	last line, first word	sliders
Page 4-13	fourth line, last word	red
Page 4-14	last line, first word	be
Page 4-15	last paragraph, first word	while
Page 4-15	last word	will
Page 4-16	last word	this
Page 4-16	last line, first word	chapter
Page 4-17	first paragraph, first word	the
Page 4-17	first paragraph, last word	active
Page 4-17	last paragraph, first word	perhaps
Page 4-17	last line, first word	view
Page 4-17	Section title, last word	grabber
Page 5-1	last paragraph, first word	to
Page 5-2	last paragraph, first word	you
Page 5-2	first line, first word	new
Page 5-3	last paragraph, first word	besides
Page 5-3	last line, first word	detail
Page 5-4	first paragraph, first word	in
Page 5-4	first paragraph, last word	circle
Page 5-4	last paragraph, first word	since
Page 5-4	last word	select
Page 5-4	last line, first word	of
Page 5-5	second line, last word	cube
Page 5-6	last paragraph, first word	unlike
Page 5-6	last word	edge
Page 5-7	first paragraph, first word	while
Page 5-7	first paragraph, last word	scene
Page 5-7	second paragraph, last word	loops
Page 5-7	second paragraph, third line, first word	an
Page 5-8	last paragraph, first word	after
Page 5-8	last word	cake
Page 5-10	second paragraph, first word	note
Page 5-10	second paragraph, last word	parts
Page 5-10	second paragraph, second line, last word	case
Page 5-11	first paragraph, first word	one
Page 5-11	second paragraph, last word	way
Page 5-11	second paragraph, third line, first word	using
Page 5-11	second paragraph, third line, last word	then
Page 6-2	first paragraph, last word	part
Page 6-2	last word	feature
Page 6-3	last paragraph, first word	we
Page 6-3	last word	easy
Page 6-5	first paragraph, first word	for
Page 6-6	first paragraph, last word	windows
Page 6-6	last word	resize
Page 6-6	third line, first word	near
Page 6-6	last line, first word	want
Page 6-6	second paragraph, third line, last word	left
Page 6-7	first paragraph, first word	even
Page 6-7	first paragraph, last word	shapes
Page 6-7	last paragraph, first word	with
Page 6-7	second line, last word	four
Page 6-7	last line, first word	ones
Page 6-7	second paragraph, second line, first word	cursor
Page 6-8	last line, first word	vertex
Page 6-9	last word	tools
Page 6-10	last paragraph, first word	so
Page 6-10	last word	may
Page 6-10	fourth line, first word	times
Page 6-10	last line, first word	world
Page 6-11	last word	in
Page 6-11	last line, first word	finished
Page 6-12	last line, first word	whole
Page 7-1	last line, first word	scene
Page 7-2	last paragraph, first word	try
Page 7-2	last word	no
Page 7-3	last word	create
Page 7-3	second line, first word	use
Page 7-4	last word	value
Page 7-4	last line, first word	good
Page 7-5	last word	color
Page 7-5	last line, first word	select
Page 7-5	Section title, last world	sky
Page 7-6	first line, last word	swatch
Page 7-6	last line, first word	invoked
Page 7-7	last word	view
Page 7-7	last line, first word	comes
Page 8-1	last word	take
Page 8-6	first line, first word	number
Page 8-8	first paragraph, last word	path
Page 8-8	second paragraph, first word	so
Page 8-8	last word	deleted
Page 8-8	second paragraph, second line, first word	place
Page 8-8	second paragraph, third line, last word	know
Page 8-10	last word	lamps
Page 8-11	last word	next
Page 8-11	second line, last word	key
Page 8-12	last paragraph, first word	when
Page 8-12	last word	again
Page 8-12	last line, first word	move
Page 8-13	last word	of
Page 8-13	second paragraph, third line, first word	make
Page 8-13	second paragraph, third line, last word	take
Page 8-15	last line, first word	project
Page 8-16	second paragraph, first word	if
Page 8-16	second paragraph, third line, first word	return
Page 8-18	second paragraph, first word	ram
Page 8-18	second paragraph, second line, last word	pixel
Page 8-18	second paragraph, third line, last word	delta
Page 8-19	first paragraph, last word	way
Page 8-19	last word	few
Page 8-19	third line, first word	short
Page 8-20	last paragraph, first word	first
Page 9-1	last paragraph, first word	an
Page 9-2	first paragraph, first word	if
Page 9-2	first paragraph, last word	stop
Page 9-3	last paragraph, first word	this
Page 9-4	last word	use
Page 9-5	third line, last word	list
Page 9-7	first paragraph, first word	as
Page 9-7	second paragraph, first line, last word	will
Page 9-7	second paragraph, last word	large
Page 9-7	last word	time
Page 9-7	first line, last word	disk
Page 9-7	second paragraph, second line, first word	begin
Page 9-7	second paragraph, second line, last word	file
Page 9-7	Section title, first word	saving
Page 9-8	last line, first word	that
Page 9-9	second line, last word	map
Page 9-9	second paragraph, first line, last word	to
Page 9-9	second paragraph, second line, first word	change
Page 9-10	first paragraph, last word	up
Page 9-10	second paragraph, last word	frames
Page 9-11	first paragraph, first word	in
Page 9-11	first paragraph, last word	gadgets
Page 9-11	second paragraph, second line, first word	parts

WARNING:
FURTHER DUPLICATION, DISTRIBUTION, OR RE-DISTRIBUTION OF THE SCULPT-ANIMATE 4D JNR SOFTWARE BEYOND THE CU AMIGA COVER DISK VIOLATES BYTE BY BYTE CORPORATION'S COPY-RIGHTS. FIGHT PIRACY – DON'T DO IT.

RETURN OF THE GODS

When Renegade released *Gods* last year, they had the good taste to package it in a stunning hand-painted cover by top comic book artist, Simon Bisley. Taking that cover as his inspiration, Jim Studt, of ACME shows how to replicate the image using *DPaint* and several hours of extreme patience.

Anyone familiar with the demos scene will probably be aware of the work of Jim Studt. No? If not, perhaps its because he works under the name of 'Airbrush' for most of his work. Only 20 years old, Jim has produced a massive portfolio of computer artwork even though it isn't his favourite means of expression.

He's a member of crack demos team, ACME, responsible for a number of cracking slideshows over the years. Based in Sweden, the group have a growing reputation for fantastically detailed artwork, and Jim is definitely one of their leading talents. He's also an avid reader of CU AMIGA and when he offered us a series of tutorials detailing the finer points of constructing a picture, we jumped at the chance.

One of Jim's stunning screens taken from an ACME slideshow.

Although his computer artwork is often stunning, Jim prefers more traditional methods of constructing his pictures. 'As you might gather from my nickname, I usually paint with airbrush instruments and spraycans in the Stockholm area. Last year I was invited over to Ibiza where I worked for the summer, selling my pictures for obscene amounts of money.'

'I prefer working with 'real' paints instead of computer GFX, as I feel very restricted with the low resolution and the amount of colours available to use. I really don't have the patience to spend more than 10 hours on one picture, although I'd like to try painting on a Paintbox system or at least the Colourburst system for the Amiga.'

Whatever his preferences, there's no denying that his work is stunning. To help other artists, Jim has drawn up a list of special tips and tricks drawn from his years using graphic packages on the Amiga.

1. Draw in Magnify mode with the lowest magnification possible. This will make mouse control easy. Use the zoom gadget until you get double-sized pixels.

2. Try to find photographs or other pictures for your reference. I know some people think you shouldn't do this, but artists have to have some point of reference. The only reason why Michelangelo didn't use photographic references was because there weren't any!

3. The more time you put into a picture, the better it's going to be. Don't be lazy using the 'shade' and 'smooth' tools. Try to make the effects by hand. This will improve your picture and teach your new techniques at the same time.

4. Take a break! After sitting at the same screen working on the same picture for hours on end, you won't be able to see any mistakes. Go and have a cup of coffee and then come back to the screen – things will be a lot clearer.

5. Be patient.

6. Define your palette: use one or two colours in varying shades. For example, from white to light blue to dark blue to black.

7. Become as familiar as possible with the graphic package you're using. Get to know all the effects and instruments, even if you never normally use them.

To begin his picture, Jim starts off with a rough sketch which takes little more than ten minutes to put down.

After the initial sketch, Jim then compares his picture to the original artwork to look for errors and get things in proportion.

After 30 minutes the final sketch is complete. It's probably best to take a break, and come back later to tweak your design.

Now the picture is beginning to get fleshed in. Colours for the metal objects have been selected and the helmet is being painted.

Painting the metal objects is a fairly laborious task. From start to finish this took Jim an energy-sapping 1½ hours.

Skin colours have now been selected and the warrior's right arm is beginning to be fleshed out.

Using a variety of techniques, including the airbrush option, the right arm is now almost complete and attention can turn to the torso.

A border and backgroun colour is selected which doesn't clash with any used so far. This helps highlight the character.

And here it is! The finished picture took Jim approximately 7 hours to complete and is almost identical to Bisley's painted artwork.

OFF THE SHELF

Ready-made graphics and animation sequences can help spice up even the most mediocre of work and save an artist a great deal of time. Sarah Hibbert takes a look at the RealThings art packages which offer visual short cuts to help add extra pazazz to your animations.

Amiga artists aren't proud – they can't afford to be. Anything which speeds up the job has got to be a plus. And not all computer animators are good artists either – so if someone else has done a bit of spadework, they don't mind using it in the least.

Which brings us to ready-made graphics – the off-the-shelf kind which you can use to pep up your own work. Of particular importance is the *RealThings* collection – a series of projects which range from sea-life to human figures, all created as anim-brushes for use in *DPaint*.

In themselves they are pretty to look at, but they only had already been done – the horse was just cribbed from the *RealThings* disk. All I had to do was add the rider in various poses, draw in the tack and add the background.

By utilising ready-made artwork you not only save yourself loads of time, your animations, however humble, have a stamp of professionalism about them. The horse-rider was just one example; in the Sea Life volume, you could have one of the menacing sharks trailing a scuba-diver, and the Safari disks abound with potential.

One trick about cartoon animation is to make life as colourful as possible. Emphasise the fact that this isn't meant to be real-life by using primary colours. And the effect can be enhanced by ensuring each item has an edge of black. This makes them stand out against each other, and is achieved from within *DPaint* by pressing the 'o' key once with black selected as your drawing colour. (By the way, pressing the capital O strips an edge of pixels instead of adding one).

The DeluxePaint IV animation movement control panel.
It is set up to rotate a brush 90° in the X axis, finishing with the brush in the starting position (try using this icon).

The heart of DPaintIV's wonderful auto-animation control is the movement requester. Master this, and the animated world's your oyster.

Hi-ho silver - awayyyy.... Part of a western scene which comes to life courtesy of DPaint. The horse and rider are part of a 15-frame animbrush which has been stamped down on a static background to move from right to left. The cacti move left to right at different speeds to give some semblance of parallax scrolling (nearer objects moving faster relative to objects further away).

form the springboard to your own animation projects. Take, for example, the first set of animations unleashed onto the Amiga world: horses. You'll soon tire of having the brushes galloping across your screen, beautifully drawn though they are. Where your skill comes in is to make use of them for your own ends.

In my case I used the package to help create an animated picture of the Old West in which an admittedly garishly-coloured cow-poke gallops across the frame as cacti pass by. The hard part

ANIMBRUSH TIPS

Once you've decided on how best to use the various images contained within the RealThings collection, it's then up to you to implement your creative ideas. Of course, it's not as easy as it at first looks, so we've drawn up a list of handy hints and tips for both novice and pro alike.

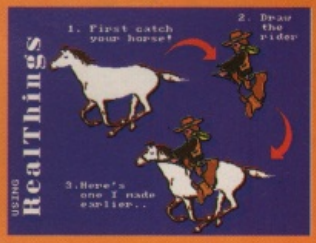
1 The RealThings animbrushes come ready-made, but like your own animbrushes they can be re-sized by painting each animbrush cell down individually into blank animation frames, then re-sizing each individual image as a normal brush. Paste these re-sized brushes back into their frame after erasing the original, and having made sure they all register (they are centred on screen in each frame), cut the whole lot out as a new animbrush.

2 If you intend adding a new element – such as the cowboy in our example – just use one frame of the horse animation, and fix the background. You can now draw the character without affecting the original horse image. This means that if you make a mistake, you can erase in safety, leaving the main image unharmed.

By pre-planning, you should be able to use colours for your additional character which are not used in the original screen; the horse in our example is white and black, and the cowboy uses primary colours. By doing it this way you can make a stencil of the original colours so that when you clip the brush of the rider, none of the horse will be picked up, and you have a brush comprised solely of the new drawing you've made.

You can then make animated alterations to successive brushes of the rider – a leg movement here, a curl of the hat there, and then paste them down on the original animation.

3 Remember, the stencil tool is ideal for having animbrushes move in front of and behind already drawn backgrounds. Protect items the animbrush needs to be painted behind by making the item's colour part of a stencil, then draw away...



How the west was won - using off-the-shelf animbrushes for your own ends makes sense; here's how a wild RealThings horse was tamed by our artist...

STEP BY STEP

In the first of an occasional series, Peter Lee shares some of his graphic short-cuts to help you become a better animator.

WHO KNOWS THE SHADOW...

It's possible to use DPaint to mimic a number of animated effects that are commonplace on professional systems. One such effect is the casting of an ever-lengthening shadow. Peter Lee explains how it's done.

DPaint's reputation as the premier graphics package is not undeserved. As well as providing more options than any other art package, it can also create elaborate special effects that have only been possible before on expensive graphic workstations.

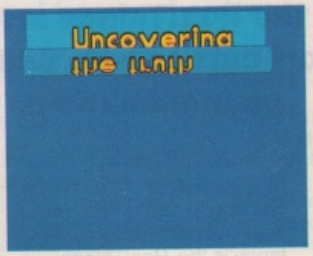
One such effect is the lengthening shadow in which an object casts an ever-longer shadow. This can be either because the assumed light source is being lowered or the object itself is rising out of the background.

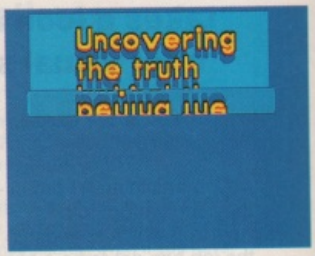
In our example we've used a wire-frame drawing of the world. Here's how it's done:

- Cut out your brush and fill the background with a mid-tone colour.
- Create six animation frames (each with the mid-blue background colour).
- With black selected as your background, click the right mouse button and drag the brush 5mm up screen then click the left button. This will draw a small black shadow with your brush painted on top. This is frame 1 of the animation.
- Swap to the spare screen (keyboard J) and store the original there for safe keeping and move back to the first screen.
- Adjust the gridlock function so that there is very little room vertically, but plenty horizontally. This is so that we can move up the screen in a fluid way whilst making sure that the brush is actually anchored in a set position. Ensure the gridlock is on, and use the picture from frame 1 as a brush (the shadowed image), and select black as the foreground colour.
- By pressing F2 on the keyboard, the entire image takes on the foreground colour, regardless of which colours it's actually drawn in.
- Position your by-now chunky black brush exactly over the original artwork, and press the number 2 key; this advances the animation to frame two (which is blank). Now, using the same technique as for the first shadow, draw up-screen in a continuous motion for about half a centimetre.
- Use this new, deeper image as your next brush, and move on to frame 3, repeating the process until you get the desired length of shadow.
- To finish off the job, go back to the spare screen, pick up your original artwork, and stamp it in the correct place of each of the frames you have drawn shadows on.

Once you've grasped the idea, you can make your shadows more subtle, and from any angle – the technique is exactly the same.

The shadow of the source object appears to lengthen throughout the duration of the animation.





GOING FOR A SCROLL

One of the best new tricks on offer in the latest batch of demos is the screen unwrap where an image peels down the screen. Peter Lee tells you how it's done.

WORKING OUT

One of the more stunning effects which demo-makers use is the screen unwrap where a rolled-up image unfurls down the screen, giving you glimpses of what's to come on the reverse of the roll. Luckily you don't need to be a programming genius to simulate this effect – all that's required is *DeluxePaint III* or *IV* and a little work.

It's a double trick really. The main magic is in fooling the eye into believing what isn't there, but the nuts and bolts of this effect is in simple brush manipulation.

STEP BY STEP

- Draw or load in your image, and then flip to the spare screen (J on the keyboard); this will be the start of creating the unfurling animation. Create 20 frames of animation, all of which will be blank at this stage.

■ Fill the screen with a mid-blue colour, and copy this frame to all other frames. Now create the roled up piece of the scroll by drawing a wide rectangle 3cm deep in dark blue. Cut this out as a brush, leaving the screen blank.

■ Now bring up the line requester (right click the mouse button with the pointer in the line tool icon), and in the N Total box, enter 20 and activate that option. This will draw 20 images for whatever length of line you now draw.

■ Select the line tool now, and with your finger on the left Amiga key, start 2 cm down from the top of the screen and draw a vertical line to around 4 cm from the bottom with your finger on the left mouse button. Let go of the button, and watch as your rectangle is drawn on successive frames gradually moving down the screen.

■ Then, working a frame at a time, preferably with the gridlock enabled to help position your starting position, draw a rectangle in the background colour (usually black) from 2cm down from the top, to the start of your roll rectangle; you are creating the top portion of the scroll, which is gradually uncovered as the roll drops down.

■ Do this on each frame (the rectangle gets deeper on each frame, but the width remains constant - the width of your initial bottom rectangle).

■ Play the animation now just to make sure all's well - it should appear as if a roll of black paper is falling down screen, uncovering more and more.

■ That's the hard part - now the fun begins. Remember that lurking in the spare screen is the image you actually want to display. Cut it out as a brush, and move back from the spare page to frame one of the animation.

■ Call up the stencil requester (SHIFT/TAB) and make everything except the background colour a stencil. Effectively this means that the only place you can paint on your animation now is in the rectangle drawn in the background colour - provided your brush is still active, you should be able to see it peeking through.

■ Position your brush image where you want in relation to this 'window', and now stamp it down on each frame in turn. More and more of your brush will be visible as the frames progress and larger rectangles are exposed.

■ A quick way to do this without resorting to the gridlock is to let go of the mouse once the position is correct, and keep your finger on left Amiga key and then keep your finger on the left ALT key (it is important which order you hold the keys down, incidentally); the frames will progress, and the image will be stamped down.

■ Play the animation again and enjoy the sight of your image being 'uncovered'.

■ Now the finishing touch - to create an underside on the scroll portion.

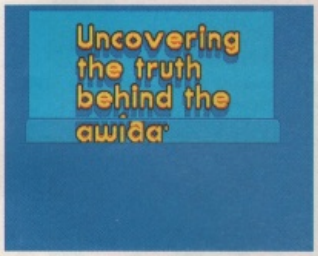
■ This is where the eye's willingness to be fooled is used to good effect. We can't waste time curving the image to fit the supposed curved shape of the roll. Instead we use a straightforward brush.

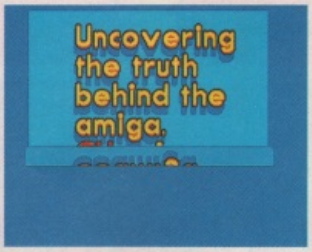
■ Flip to the spare screen, and make a brush out of a portion of the image just below the bit which you can see on the animation frame. Flip the brush by pressing the y key, and go to the animation frame.

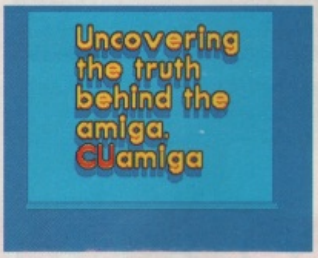
■ Using the stencil function again, make the dark blue rectangle you drew to start with the only unprotected colour. Now you can paste the flipped brush onto it, to simulate a rear-view of what's about to be unfurled next.

■ Do this for each frame, flipping back and forth between the next animation screen and the spare screen with your image on it, moving down the spare-screen image a little at a time, remembering not to include any part of it which is already displayed on the frame you're working on - you have to show what's about to be unfurled, remember.

■ All that's left to do now is pat yourself on the back, gather a small audience and play back the animation - a masterpiece of an effect!







Going for a scroll... Unravel the secrets of this stunning effect by following our guidelines. As the animation progresses, the scroll opens to reveal your message, whilst what's to come shows through on the scroll's reverse.

Mid-way through the technique; that blank rectangle will allow you to peep your main image through once the stencil function is activated.

SIX OF THE BEST

With five years-worth of Amiga animations behind him, Peter Lee offers some of his top hints and tips on ways of becoming a more accomplished animator.

1 Animations are hungry for memory. Use the lowest possible resolution and the fewest colours necessary unless you intend to videotape the sequence, where higher resolutions give sharper images. Bad news is that animations at higher resolutions are comparatively slower because of the additional amount of data to be shifted by the Amiga.

2 If you are animating for video work, tone down the red and blue elements of the colours to minimise any colour bleeding into surrounding areas.

3 If you have an anim brush active, pressing the 7 key will move the animbrush back a frame, 8 will move the sequence forward, which can also be held down to see a running preview of the brush.

4 Providing you have the time, using the anti-alias function while rendering rotational brush animations will give smoother-looking results on playback

5 Using the movement fill option with an animbrush – especially a digitised one – with the brush tilted backwards in the Z plane using the perspective option, gives outstanding results when played back. The screen fills, in true perspective, with individual brushes, which spring to life like living floor tiles when played back. By also moving the tilted brush down screen a couple of dozen pixels as well, you can create a moving carpet of multiple moving images.

6 If you want an animbrush to begin life off-screen, then ease in, you will have to reposition the brush handle to a point outside the brush image. Use the ALT/Z left mouse button combination to place the brush handle - where the mouse pointer holds the brush - in an appropriate place.

Everything in Heimdall, from the island maps to the fight scenes was sketched on paper first.

Imaging the scene: going to bed with the virgin – only to have a fully grown son the next day.

INTRODUCING...

Love them or hate them, there's no doubting that intro sequences can show off the Amiga's incredible graphical prowess. Steve Merrett finds out what exactly goes into setting a scene...

SETTING THE SCENE

The argument for scene-setting introductory sequences is one that has been going for years. Some, like me, think that they are fine, providing they can be skipped and don't unnecessarily stop the player from getting into the game, whilst others feel they are integral to getting the player in the 'mood' for the forthcoming events.

Some can be quite stunning in their effect and defintely enhance the perceived value of a game. *Take Shadow Of The Beast II,* for example. As the player booted up the first disk, the screen showed a small cottage which was isolated in the middle of a raging storm. From here, a mystical creature is shown mutating into the Beast which would snatch the game's hero from his family. As the creature swooped down on the cottage, smashing through the roof and grabbing the baby, it was hard not to be impressed. But where do the coders start when they get the ideas for such sequences?

EXTRA VALUE

According to Jerr O'Carroll, the graphic-supplying half of Core Design's *Heimdall* team, it's all down to planning. 'With *Heimdall*', he explains, 'we knew that people would be impressed with the way the game looked, and we also knew that it would take up to five disks. Consequently, the addition of the demo was to make it look even better value for money.'

'Once we had the basic idea', Jerr continues, 'it was just a matter of getting it all down on paper. Core always plan everything meticulously, as this allows us to allocate memory early on and allow for any unseen problems. We came up with about thirty sketches which were obviously too many, but by tightening up key areas, we managed to get it down to a feasible fifteen.' Jerr admits that it's very easy to get carried away when putting such a sequence together, and this was a trait which used to afflict Psygnosis games. He says that it's integral that the plot of your intro ties in with the game or it's rendered virtually useless – a perfect example of this was with Psynosis's *Stryx* a few years back. I remember booting it up for the first time and being blown away by the stunning monochromatic images of the intro sequence. A ray-traced car whizzed towards me, lights reflected from its shiny bonnet, only to give way to a trashy platform game with absolutely no car-based content at all!

'Putting an intro sequence together is akin to directing a film,' offers Jerr. 'It's all very well having loads of good ideas, but cramming them all in to a limited space can only be done if corners are cut. With *Heimdall*, we opened with a God crouched over something which, in another frame, was revealed to be the Earth. From here, we cut to Thor holding Heimdall in the palm of his hand, and then to the girl's hut. We managed to save loads of memory here with sly palette swaps for the lightning, and then we simply drew the interior of the hut and added roughly six frames for the girl's rude awakenening. In all, it took just eight full bitmapped screens, and a few anims for the sprites which we overlayed.'

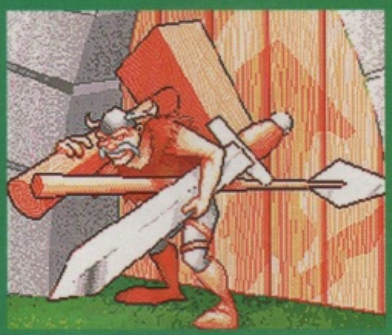
Minimal animation was used in this scene, with just the human's hair animated.

OLD FAITHFUL

Whilst some animators prefer the more complex *Movie Setter*, Jerr relied on good old *DPaint III* for all his *Heimdall* work. 'It's excellent,' he enthuses. 'Everything in *Heimdall* was drawn using *DPaint* – even the walls of the rooms – and it was its brush utility that made it so useful.' He continues: 'When it came to, say, the scene where the God has the World revolving on his finger, I simply drew up the God and the Earth, and cut out the Earth as a brush. From here, I simply changed the detail on the planet a little, and played it through a sequence of roughly eight animations. The result as the countries scolled by was one of the planet revolving – exactly how I envisaged it, too.'

So where does Jerr stand in the 'for or against' argument regarding intro sequences? 'I have to admit,' he says, 'I'm all for them. They add a little extra to a game and certainly add to the scenario if used well. However, and I know this is sitting on the fence somewhat, but I also think that they should be able to be bypassed if necessary – there's nothing to put someone off a game more than having to sit through the same sequence time and time again.' Jerr is currently working with Core again, this time on the long-awaited sequel to *Heimdall*. Detailing the epic Battle Of Ragnorok that the last game preceded, he is up to his arms in game design at the moment. Will that have an intro? 'You bet!' he laughs, and gets back to creating worlds...

Starting on an astral island, the scene swaps to one of the Earth spinning and then to Earth itself. All in all, a mere five pictures make up the sequence, but such is the clever cutting between the scenes that it seems that there are many more. In addition, 8th Day also added text-based screens between the graphical interludes and these form a narrative aid which helps detail what's going on.



After getting everything down on paper, the next stage was to draw it all on DPaint. After outlining the ideas, the pics were then filled section by section using 16 colours.

TOP TEN INTRO SEQUENCES

The last few years have seen some corking intro sequences to games. Core Design appear to place great store on game intros and nearly every one of their games has a mammoth intro. Nor surprisingly, three of their games make the top ten, as do two games from Canadian-based Readysoft. The latter are famous for their conversions of the Space Ace arcade games and feature some of the best graphics you're ever likely to see on the Amiga. Bullfrog's Powermonger also makes the grade, not for its brilliant intro graphics but for the superb soundtrack which accompanies it – an aspect of animation that is often overlooked! One other entry worth a mention is Team 17's Alien Breed intro which begins with a comic-strip progression of mono panels detailing the storyline and then cuts to a stunning ray-traced animation by the prolific Tobias Richter.

1. Thunderhawk (Core)
2. Heimdall (Core)
3. Shadow of the Beast II (Psygnosis)
4. Super Space Invaders (Domark)
5. Wrath of the Demon (Readysoft)
6. Space Ace II (Readysoft)
7. Wolfchild (Core)
8. Alien Breed (Team 17)
9. Another World (Delphine)
10. Powermonger (Bullfrog)

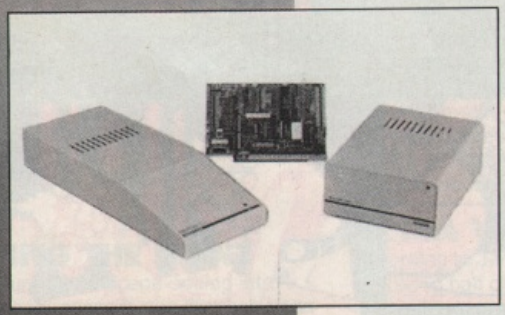
HARD DRIVE CONTROLLERS

IDE, SCSI and IDE/SCSI Interface Cards

DataFlyer™

HARD CACHE

WORLD CLASS INTERFACES AT AN OUT OF THIS WORLD PRICE



IDE, SCSI and IDE/SCSI DataFlyers

P.O.A

The DataFlyer line of hard drive controllers offers great performance and versatility at a cost attractive to the price conscious customer. The DataFlyer provides a choice of SCSI, IDE or both on the same card. Each card can accept the DataFlyer RAM 8 Megabyte plug-on memory card. Each controller features easy formatting prep programs, driver software and all hardware and cables. The drive installs in a standard expansion slot or the chassis provided. Both the controller and memory cards in the A500/1000 chassis' can be removed and installed in an A2000. It is compatible with Workbench 1.3 and 2.0. Install the DataFlyer onto any Amiga and your off to the races.

FEATURES:

- Auto-Booting at power up.
- Auto-Installing software means super easy format.
- Fast File System compatible with KickStart 1.3 or higher.
- Special driver provides AmaxII compatibility. SCSI Only.
- Optional DataFlyer RAM 8 Mb memory board plugs onto interface.
- Syquest compatible with auto-diskchange. SCSI Only.
- Holding down mouse button defeats Auto-Boot for games..
- Includes all cables and hardware.
- Compatibility with all major hard drives.
- External hard drive activity light.

SCSI
- Non-DMA.
- Optional SCSI pass through cable.
- 480,000 byte per second data transfer rate using Diskspeed and a Quantum drive.

IDE
- Add up to two IDE or AT drives.
- 800,000 byte per second data transfer rate using Diskspeed and a Quantum drive.

IDE/SCSI
- Operate both kinds of drives at the same time.

A FULL WARRANTY ONE YEAR

HARD CACHE LTD
2B LEORY HOUSE, 436 ESSEX ROAD,
LONDON N1 3QP
TEL: 071 704 1614